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OMEGA
ENGINEERING, INC.
An OMEGA Technologies Company

OMEGAMETER™

HHM57
DIGITAL MULTIMETER
THERMOMETER

Operator's Manual

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

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Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. BEFORE RETURNING ANY INSTRUMENT, PLEASE CONTACT THE OMEGA CUSTOMER SERVICE DEPARTMENT TO OBTAIN AN AUTHORIZED RETURN (AR) NUMBER. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. **Returnee's name, address, and phone number.**
2. **Model and Serial numbers.**
3. **Repair instructions.**

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. That way our customers get the latest in technology and engineering.

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SECTION 1 INTRODUCTION

1.1 DESCRIPTION

The OMEGA® HHM57 Digital Multimeter, a versatile unit, can measure the following parameters:

1. DC voltage (200mV to 1000VDC)
2. AC voltage (200mV to 750VAC)
3. DC current (200μA to 10A)
4. AC current (200μA to 10A)
5. Temperature (-20°C to 750°C, 0°F to 1400°F)
6. Transistor h_{fe} parameter (0 to 1000)
7. Diode (Forward Voltage and Polarity)
8. Resistance (200Ω to 2000MΩ)
9. Continuity (beeper)
10. Capacitance (2nF to 20μF)

1.2 FEATURES

* Type K Chromel/Alumel Thermocouple input with °C and °F display.
* Easy to read 1/2" high LCD display.
* Safety Test Leads and Compact Housing.
* Low Power Consumption for more than 200 hours of battery life with one lithium battery.
* Tilting Stand integral with case.

SECTION 2 UNPACKING

Remove the Packing list and verify that all equipment has been received. If there are any questions about the shipment, please call the OMEGA Customer Service at 1-800-622-2378.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

Please note that the following items should be in the box:

1. 1 pair of test leads
2. 1 spare fuse (0.8A) stored in battery compartment
3. 1 lithium 9V battery
4. 1 operator's manual

SECTION 3 HOW TO TAKE VARIOUS MEASUREMENTS

3.1 DC VOLTAGE MEASUREMENTS (V)

1. Connect red test lead to "V-Ω" input connector and black test lead to COM input connector.
2. Set AC/DC switch to DC and turn the Function/Range knob to the desired V position. If magnitude of the voltage is not known, set knob to the highest range and move down to a lower range until a satisfactory reading is obtained.
3. Connect test leads ACROSS the device or circuit being measured.
4. The voltage value will appear on the digital display as well as the polarity.

3.2 AC VOLTAGE MEASUREMENTS (V)

1. Connect red test lead to "V-Ω" input connector and black test to COM input connector.
2. Set AC/DC switch to AC and turn the Function/Range knob to the desired V position. If magnitude of the voltage is not known, set knob to the highest range and move down to a lower range until a satisfactory reading is obtained.
3. Connect test leads ACROSS the device or circuit being measured.
4. The voltage value will appear on the digital display.

3.3 DC CURRENT MEASUREMENT (A)

1. Connect black lead to the COM input connector. For current measurements up to 200 milliamperes, connect red test lead to the mA input connector. For current measurements between 200 mA and 10A, connect the red test lead to the 10A input connector.

2. Set AC/DC switch to DC and turn the Function/Range knob to the desired A position. If magnitude of current is not known, set knob to the highest range and move down to a lower range until a satisfactory reading is obtained.

3. Turn off power to the device or circuit being tested and discharge all capacitors.

4. Open the circuit in which current is to be measured. Securely connect test leads IN SERIES with the load in which current is to be measured.

5. Turn on power to the circuit being tested.

6. Read current value on the digital display.

7. Turn off all power to the circuit being tested and discharge all capacitors.

8. Disconnect test leads from circuit and re-connect circuit that was being tested.

3.4 AC CURRENT MEASUREMENT (A)

1. Connect black lead to the COM input connector. For current measurements up to 200 milliamperes, connect red test lead to the mA input connector. For current measurements between 200 mA and 10A, connect the red test lead to the 10A input connector.

2. Set AC/DC switch to AC and turn the Function/Range knob to the desired A position. If magnitude of current is not known, set knob to the highest range and move down to a lower range until a satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.

4. Open the circuit in which current is to be measured. Securely connect test leads IN SERIES with the load in which current is to be measured.

5. Turn on power to the circuit being tested.

6. Read current value on the digital display.

7. Turn off all power to the circuit being tested and discharge all capacitors.

8. Disconnect test leads from circuit and re-connect circuit that was being tested.

3.5 RESISTANCE MEASUREMENTS (Ω)

All resistance ranges on the multimeter are low-power ohms except for the 200 ohm range. The low power ohm allows accurate measurements of in-circuit resistance, since test voltage is below that necessary to turn on a diode junction.

NOTE

In the 200Ω range, the continuity beeper function is activated.

1. Connect the red test lead to the V-Ω input connector and the black test lead to the COM input connector.

2. Set Function/Range knob to the desired Ω position. If magnitude of resistance is not known, set knob to the highest range and move down to a lower range until a satisfactory reading is obtained.

3. If the resistance being measured is connected to a circuit, turn off power to the circuit being tested and discharge all capacitors.

4. Connect test leads to the circuit being measured. When measuring high resistance, be sure not to contact adjacent points even if it is insulated, because some insulators have a relatively low insulation resistance, causing the measured resistance to be lower than the actual resistance.

5. Read resistance value on the digital display. If a high resistance value is shunted by a large value of capacitance, allow digital reading to stabilize.

NOTES

All resistance ranges on the HHM57, except the 200Ω range, are low-power ohms. This allows accurate measurements of in-circuit resistance because the test voltage is below that necessary to activate a diode junction.

The 2000MΩ range has a fixed 10-count in its reading. When the test leads are shorted together in this range, the meter will display 010 in the 2000MΩ range. This reading must be subtracted in order to obtain a true measurement. For example, when measuring a resistance of 100MΩ on the 2000MΩ scale, the display will show 110.

3.6 DIODE TEST MEASUREMENTS (⊣▶⊢)

1. Connect red test lead to the V-Ω input connector and black test lead to the COM input connector.

2. Set Function/Range knob to the diode test position.

3. If the semiconductor junction being measured is connected to a circuit, turn off power to circuit being tested and discharge all capacitors.

4. Connect test leads to the device.

5. Read forward value on digital display.

6. If the digital display reads over-range (1), reverse the lead connections. The placement of the test leads when the forward reading is displayed indicates the orientation of the diode. The red lead is positive and the black lead is negative.

   If over-range (1) is displayed with both lead connections, the junction is open.

   If a low-reading (less than 1,000) is obtained with both lead connections, the junction is shorted internally or (if junction is measured in a circuit) the junction is shunted by a resistance less than 1KΩ. In the latter case, the junction must be disconnected from the circuit in order to verify its operation.

3.7 TRANSISTOR JUNCTION TEST

Bipolar transistors can be tested in the same way as diode junctions formed between the base and emitter and the base and collector of the transistor. Measurement between the collector and emitter also should be made to determine if a short is present. Go through steps 1-6 in Section 3.6 for the measurement of bipolar transistor characteristics.

3.8 TRANSISTOR H_{fe} MEASUREMENTS

1. The transistor must be out of the circuit. Set the Function/Range knob to the H_{fe} position.

2. Plug the emitter, base and collector leads of the transistor into correct holes in either the NPN or the PNP transistor test socket, whichever is appropriate for the transistor you are checking. Read the H_{fe} (beta, or DC current gain) in the display.

3.9 CAPACITANCE MEASUREMENTS (F)

1. Set the Function/Range knob to the desired capacitance range.

2. Short the leads of the capacitor to be tested together to insure that there is no charge on the capacitor.

3. Insert the capacitor leads into the capacitor test socket. Note there are two (2) groups of three holes. One lead must be inserted into a hole of the left group and the other lead must be inserted into a hole of the right group.

4. Read the capacitance value on the display.

3.10 CONTINUITY MEASUREMENTS ( ))))

1. Turn the knob to the))) position.

2. Continuity between probe tips will be indicated by the audible beeper when resistance is below 100 ohms.

3.11 TEMPERATURE MEASUREMENTS (°C OR °F)

1. Connect the Type K thermocouple to the jack on the instrument observing the proper polarity.

2. Set the Function/Range knob to °F or °C range. If the temperature is not known, set knob to the higher range and move down to the lower range until a satisfactory reading is obtained.

3. Place the thermocouple tip on or in the material to be measured and take the temperature reading directly from the display.

SECTION 4 BATTERY AND FUSE REPLACEMENT

To prevent electrical shock hazard, turn off the multimeter and any device or circuit under test and disconnect the test leads before removing the battery cover.

4.1 BATTERY REPLACEMENT

1. Loosen and remove the screw in the battery cover.

2. Remove the battery cover by sliding it towards the bottom of the meter.

3. Disconnect and remove the old battery from the meter. Install a new battery and stuff the excess wire near the battery clip.

4. Slide the battery cover carefully back up into the secure position making sure not to crimp the wires and re-fasten with screw.

CAUTION

FAILURE TO TURN OFF THE MULTIMETER/THERMOMETER BEFORE INSTALLING THE BATTERY COULD RESULT IN DAMAGE TO THE INSTRUMENT AND THE BATTERY.

IF THE BATTERY IS CONNECTED INCORRECTLY, YOU COULD DAMAGE THE INSTRUMENT.

4.2 FUSE REPLACEMENT

1. Loosen and remove the screw in the battery cover.

2. Remove the battery cover by sliding it towards the bottom of the meter.

3. Remove the blown fuse and replace with a new one. An extra fuse is provided in the storage compartment to the left of the battery in the multimeter. To prevent fire, the fuse must be 0.8A, 250V.

SECTION 5 TROUBLESHOOTING

If there appears to be malfunction during the operation of the meter, the following steps should be performed in order to isolate the problem:

1. Check the battery.

2. Review the operating instructions for possible mistakes in operating procedure.

3. Inspect and test the test probes for a broken or intermittent connection.

4. Inspect and test the fuse. If it is necessary to replace the fuse, be sure to install one that is 0.8A, 250V.

SECTION 6 SPECIFICATIONS

DC VOLTAGE				
RANGE	**OVERVOLTAGE PROTECTION**	**RESOLUTION**	**INPUT IMPEDANCE**	**ACCURACY**
200mV	500VDC/350VAC for 15 sec.	100μV	10MΩ	±0.5% reading + 1 digit
2V 20V 200V 1000V	1200VDC/800VAC			

AC VOLTAGE				
RANGE	**OVERVOLTAGE PROTECTION**	**ACCURACY**	**RESOLUTION**	**INPUT IMPEDANCE**
200mV	500VDC/350VAC for 15 sec.	±1% reading + 4 digits @ 50-500 Hz	100μV	10MΩ
2V 20V 200V	1200VDC/800VAC			
750V		±1.5% reading + 4 digits		

DC CURRENT				
RANGE	**OVERCURRENT PROTECTION**	**ACCURACY**	**VOLTAGE DROP (MAX)**	**RESOLUTION**
200μA 2mA 20mA 200mA	0.8A/250V fuse	±1% reading + 1 digit	700mVDC	100μA
10A	unfuse, up to 12A for 30 sec.	±2% reading + 3 digits		

AC CURRENT				
RANGE	**OVERCURRENT PROTECTION**	**ACCURACY**	**VOLTAGE DROP (MAX)**	**RESOLUTION**
200μA 2mA 20mA 200mA	0.8A/250V fuse	±1.2% reading + 4 digits @ 50-500 Hz	700mVAC	100nA
10A	unfuse, up to 12A for 30 sec.	±2% reading + 4 digits @ 50-500 Hz		

TEMPERATURE		
RANGE	**RESOLUTION**	**ACCURACY**
-20 to 750°C	0.1°C for 200°C Range 1°C for 1400°C Range	±(3% + 1 digit): up to 150°C ±3% reading over 150°C
0 to 1400°F	0.1°F for 200°F Range 1°F for 1400°F Range	±(5% + 2 digits) : up to 225°F ±3% reading over 225°F

		RESISTANCE		
RANGE	**MAX. TEST VOLTAGE**	**ACCURACY**	**RESOLUTION**	**OVERLOAD PROTECTION**
200Ω	3.2V	±1% reading + 3 digits	100mΩ	500VDC/AC
2KΩ 20KΩ 2000KΩ	0.3V	±0.8% reading +1 digit		
20MΩ	0.3V	±3% reading + 1 digit		
2000MΩ	3.2V	±5% (reading-10 digits) + 1 digit		

CAPACITANCE				
RANGE	**TEST FREQUENCY**	**TEST VOLTAGE**	**RESOLUTION**	**ACCURACY**
2nF 20nF 200nF 2μF 20μF	400 Hz	50mV	1pF	±3% reading + 10 digits

TRANSISTOR H_{fe} TEST		
RANGE	**BASE DC CURRENT**	V_{ce}
0 to 1000	10μA	2.8 ±0.4V

DIODE	
TEST CURRENT	**TEST VOLTAGE**
1.0 ± 0.6mA	3.2V max

CONTINUITY	
THRESHOLD	**RESPONSE TIME**
<100Ω	<100msec

DISPLAY: 3-1/2 digit LCD with max reading of 1999

POLARITY: Automatic, (-) negative polarity indication

ZERO ADJUSTMENT: Automatic

OVERRANGE INDICATION: Highest digit of (1) or (-1) is displayed

LOW BATTERY: The (LO BAT) is displayed when the battery voltage drops below the operating voltage.

MEASUREMENT RATE: 3 measurements per second, nominal

SPECIFICATIONS (Cont'd)

OPERATING TEMPERATURE:	0°C to +50°C at 70% RH
STORAGE TEMPERATURE:	-20°C to +60°C; 0 - 80% RH with battery removed.
ACCURACY:	Accuracy specifications at 23 ±5°C, <75% RH
POWER:	Single, standard 9V lithium battery
BATTERY LIFE:	200 hours with alkalive battery, 300 hours with lithium battery.
DIMENSIONS:	6.3" (L) x 3.3" (W) x 1" (H) 16 cm x 8.4 cm x 2.6 cm
WEIGHT:	9 ounces (250 g) including battery

SECTION 7 ACCESSORIES

A soft padded vinyl carrying case may be ordered as an optional accessory for the HHM57 multimeter. The part number is SC57.

A replacement 9 volt lithium battery may be ordered from OMEGA Engineering (part number U9VL).

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